Glutaraldehyde Overview – Quick Tips

What Is Glutaraldehyde Used For?

Glutaraldehyde has a variety of uses in many industries and occupations. It is most commonly found in the healthcare industry, used to disinfect medical equipment that cannot be heat sterilized. The main uses of glutaraldehyde include:

- As a cross-linking and tanning agent
- As a biocide in metalworking fluids and in oil and gas pipelines
- As an antimicrobial in water-treatment systems
- As a slimicide in paper manufacturing
- As a preservative in cosmetics
- As a sterilant in animal housing
- As a tissue fixative in histology and pathology labs
- As a hardening agent in the development of X-rays
- In embalming solutions
- In the preparation of grafts and bioprosthesis

Glutaraldehyde ($C_5H_8O_2$) is most often used in a diluted form with solutions ranging from 0.1 to 50 percent glutaraldehyde in water. It is a colorless, oily liquid and sometimes has an odor of rotten apples. In a vapor state, glutaraldehyde has a pungent odor, with an odor threshold level of 0.04 parts per million (ppm).Trade names for glutaraldehyde-containing formulations include Cidex®, Sonacide®, Sporicidin®, Hospex®, Omnicide®, Metricide®, Rapicide® and Wavicide®.

Exposure Limits

OSHA has not established a permissible exposure limit (PEL) for glutaraldehyde. NIOSH has established a recommended exposure limit (REL) for glutaraldehyde of 0.2 ppm. This is a time-weighted average (TWA) exposure limit for up to a 10-hour workday during a 40-hour workweek. The American Conference of Governmental Industrial Hygienists (ACGIH) has set a ceiling Threshold Limit Value (TLV) of 0.05 ppm. This is the airborne concentration that should not be exceeded during any part of the work shift.

Does Glutaraldehyde Present a Health Hazard?

Glutaraldehyde is an irritant to the skin, eyes and respiratory system. Exposure symptoms might include burning sensation, dermatitis, headache, coughing, shortness of breath, nausea and vomiting. Continuous repeated exposure to glutaraldehyde might intensify the skin and respiratory irritant effects. Anyone with a history of skin or eye disorders might be at an increased risk from exposure.

First Aid

Eyes: If glutaraldehyde contacts the eyes, immediately flush the eyes with large amounts of water, occasionally lifting the lower and upper lids. Seek medical attention immediately. Contact lenses should not be worn when working with glutaraldehyde.

Skin: If glutaraldehyde contacts the skin, immediately flush the contaminated skin with water for at least 15 minutes. If glutaraldehyde penetrates clothing, immediately remove the clothing and flush the skin with water for at least 15 minutes. Promptly seek medical attention.

Inhalation: If large amounts of glutaraldehyde are inhaled, move the exposed person to fresh air at once. If breathing has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep the person warm and at rest. Get medical attention as soon as possible.

Ingestion: Get medical attention immediately.

What Type of Personal Protective Equipment Should Be Used with Glutaraldehyde?

Personal protective equipment (PPE) must be used with engineering and administrative controls to help prevent glutaraldehyde exposure.

Safety goggles should be considered where concentrated glutaraldehyde is used or where splashing may occur, it is best to use indirect-vented or non-vented goggles, and to avoid goggles with foam padding.

Protective clothing should be worn when handling glutaraldehyde. Polyethylene, polyvinyl chloride, Viton™, butyl rubber, natural rubber latex, neoprene and nitrile rubber provide adequate protection from glutaraldehyde solutions and are compatible materials for gloves and aprons.

Respiratory protection: Although an immediately dangerous to life and health (IDLH) exposure limit has not been established for glutaraldehyde, several respirator manufacturers have issued guidelines. 3M’s respirator selection guide can be found here and while MSA’s can be found here.

Air Monitoring

Personal monitors, passive-gas monitors and vapor meters can help determine workers’ exposure to glutaraldehyde.

Personal monitors operate on the diffusion principle and require analysis by an outside laboratory to verify exposure levels. NIOSH sampling method 2532 or OSHA method 64 are suggested for collecting samples.

Passive-gas monitors operate on the diffusion principle and are direct-read monitors. They provide immediate on-site results with easy-to-read color changes.

Vapor meters quickly measure airborne concentrations. A given quantity of air is sampled and the concentration is directly displayed.

Commonly Asked Questions

Q: What the difference between a disinfectant and a sterilant?

A: A disinfectant is a chemical or physical agent that is applied to inanimate objects to kill microorganisms. Bleach (sodium hypochlorite), phenolic compounds, and formaldehyde are examples of disinfectants. A sterilant is a chemical or physical process that is applied to inanimate objects to kill all microorganisms as well as spores. Glutaraldehyde and ethylene oxide are examples of sterilants.

Q: Where is exposure to glutaraldehyde most likely?

A: Exposure to glutaraldehyde is most likely in the healthcare industry. It is used in hospitals for cold sterilization of medical supplies and instruments, and also as a disinfectant in urology, endoscopy and dental departments. It is also used as a fixative in X-ray developing solutions.

Q: Is glutaraldehyde considered a fire hazard?

A: No, glutaraldehyde is a non-flammable liquid.

Q: What is the recommended protective clothing when handling glutaraldehyde?

A: Aprons and other protective clothing made from materials such as polyethylene, polyvinyl chloride, Viton™, butyl rubber, natural rubber latex, neoprene or nitrile rubber can offer protection when handling glutaraldehyde solutions.

Sources

OSHA Occupational Chemical Database for Glutaraldehyde

Krister Forsberg and S.Z. Mansdorf, "*Quick Selection Guide to Chemical Protective Clothing*," Sixth Edition.

National Institute of Occupational Safety and Health, "*NIOSH Pocket Guide to Chemical Hazards-Glutaraldehyde*"

National Institute of Occupational Safety and Health, "Workplace Safety and Health Topics – Glutaraldehyde"